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AMBICOLORATION, PARTIAL AND COMPLETE, IN THE SOUTHERN FLOUNDER, *PARALICHTHYS LETHOSTIGMA*

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The American Museum's collection of teratological fishes was enriched late in 1934 by the incoming of two ambicolorate summer flounders taken in Louisiana waters. Press of other work has delayed study of these until now. This is fortunate, since in March, 1936, there came from Norfolk a third ambicolorate specimen of this flounder. The three make a perfect series. The brief history of each will be given later. So far as I can find there is no previous record of ambicoloration in *Paralichthys lethostigma*.

The summer flounder is a western Atlantic heterosomate fish. It has been recorded from New York, but there it is sometimes confused with *Paralichthys dentatus*. It is most common from North Carolina south along the Atlantic coast, throughout the Gulf, and as far east as Trinidad. It is much given to penetrating sounds and ascending rivers.

THE NORMAL FISH

Paralichthys lethostigma is a sinistral or left-pointing fish, without any marked peculiarities of form or color. Hence it does not seem necessary to publish a figure of the normal fish. The right or rotated eye is found well across on the left side of the dorsal crest. The color of the upper side is a dark olive-brown with some rather obscure darker mottlings. It is often confused with *P. dentatus*, which, however, has a number of small dark ocellated spots particularly on the dorsal part of the upper side. Preserved specimens of both fishes have much the same color and are best distinguished by their gill-rakers—12 on the first arch in *P. lethostigma* and 14—17 (occasionally 12—13) on the first arch in *P. dentatus*.

The southern flounder grows to a considerable size, the largest fish (so far as recorded) being two feet long. This specimen, according to H. M. Smith,¹ was taken at Plymouth, North Carolina, from the Roanoke River.

¹ "The Fishes of North Carolina." N. C. Geol. and Econ. Survey, Raleigh, N. C., 1907, p. 388.

TWO PARTIALLY AMBICOLORATE SPECIMENS

These two fish are of different degrees of ambicoloration and form a two-fish series leading up to specimen no. 3. Figures and descriptions follow.

A PARTIALLY AMBICOLORATE FISH

WITHOUT EYE AND DORSAL FIN ANOMALIES

This specimen was found in the New Orleans fish market by Mr. Milton Lindner of that city on October 11, 1934. Its history could not be traced, but it probably came from some point on the Louisiana or on the near-by Mississippi coast. This well-preserved fish measures from tip of snout to tip of caudal fin 365 mm. (14.4 in.), and weighs 368.5 grams (13 oz.). It is probably an average-sized summer flounder.

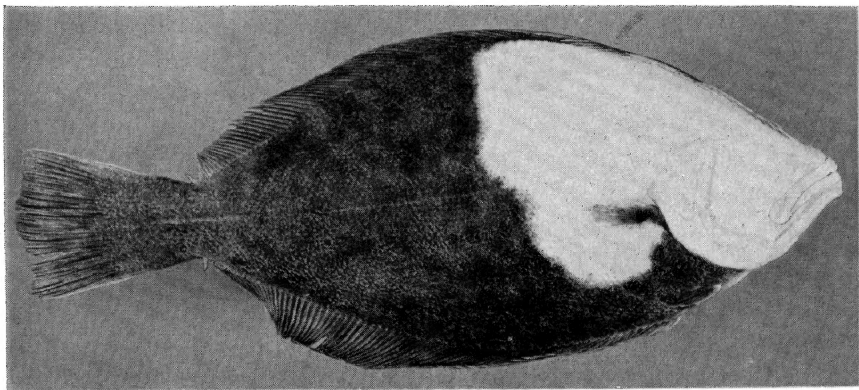


Fig. 1. Lower surface of a partially ambicolorate *Paralichthys lethostigma*. Note absence of eye and dorsal fin anomalies.

Specimen from Mr. Milton Lindner.

The upper side of this sinistral fish is entirely normal in every respect, but the lower or right side presents an interesting case of partial ambicoloration (Fig. 1). Nearly $\frac{3}{5}$ ths of the lower surface is of the same dark color as the upper surface as Fig. 1 shows. The limit of the dark area above the lateral line is a nearly perpendicular line located 8.25 in. from the tip of the tail. Below the lateral line, the line of demarcation inclines obliquely downward a distance of about 2 in., then turns forward and upward to the base of the pectoral fin. This dark lower surface is an inch wide to the tip of the anal fin, but widens out forward from this point. This fin, the area above it to the edge of the operculum,

the base of the pectoral, and almost its whole area are dark. The whole anal fin is dark. The dorsal fin, forward of a line from the middle of the pectoral, is white. So is the ventral edge of the body anterior to the anal fin. As Fig. 1 shows the whole lower head and a large part of the forward part of the body are white.

As is the general rule, when the whole lower head and the larger anterior part of the lower side are uncolored, there are no other anomalies. The eye has crossed the dorsal crest and has come to rest in its normal position on the left side, and the anterior part of the base of the dorsal fin is likewise absolutely normal. This fish is a perfectly normal partially ambicolorate flounder of the group having the whole lower head and part of the anterior section of the body white.

Mr. Lindner kindly writes me that on August 30, 1934, he saw another partially ambicolorate southern flounder in the fish market in New Orleans. The under side of this was colored like the upper surface, save that the head was white. There were no eye nor dorsal fin anomalies. Unfortunately this specimen (about 20 in. long) was too large to be preserved.

AN ALMOST TOTALLY AMBICOLORATE FISH
WITH EYE ALMOST OVER DORSAL CREST AND WITH A HOOKED
DORSAL FIN

This fine specimen was collected by Mr. E. L. McIlhenny in the vicinity of Avery Island, Louisiana, on June 11, 1929. It is slightly smaller than the other specimens, measuring 335 mm. (13.2 in.) in total length and weighing 354 grams (12.5 oz.). This fish came to me in fine condition.

The upper side of the body seems entirely normal until one notices (Fig. 2) that the right or rotating eye is out of its normal place, is high upon on the dorsal ridge with its right edge arrested on the dorsal crest. This eye is overhung by the anterior base of the dorsal fin, under which is a deep backwardly-extending cavity—i.e., the anterior dorsal fin-edge is deeply hooked. Two other minor things may be mentioned. As Fig. 2 shows there is a small white patch obliquely placed behind the rotated eye, there are white blotches in front of this eye, and the anterior point of the hook is white. These are not artifacts, but I cannot account for their presence nor do I perceive their significance.

However, when one turns to the under surface, there is found a truly remarkable condition. The rotated eye is just over the dorsal crest and is plainly visible from the lower side. The whole under surface of the

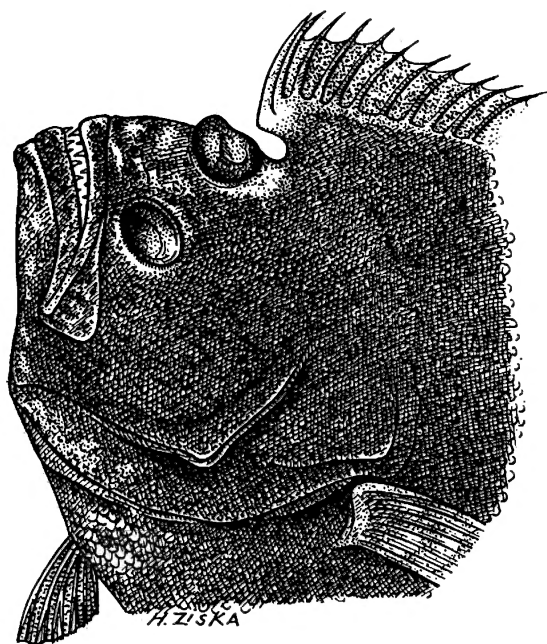


Fig. 2. Upper side of head of a partially ambicolorate southern flounder. Note the eye which is barely over the dorsal crest, and the white patches behind it. Note also the hook of the dorsal fin white on the point.

Specimen from Mr. J. C. Pearson.

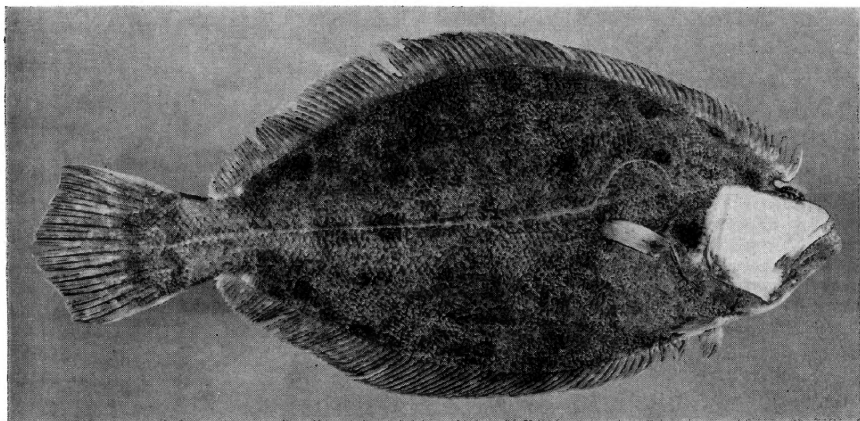


Fig. 3. Lower or blind surface of the flounder of Fig. 2. Note the white lower head framed in black, the right eye still showing just over the dorsal crest, and the overhanging hooked dorsal white on the point.

Specimen from Mr. J. C. Pearson.

body including dorsal, caudal and anal fins is as dark as the upper one. The pectoral fin away from the base is white, and the pelvics are white on their inner or lower surfaces. The edge of the abdomen and the ventral edge of the opercle are white almost to the chin. The lower head (Fig. 3) is white with an almost complete encircling rim of dark on it. About half of the upper jaw and all of the lower are dark. The opercle is quite black save on the upper edge. This is balanced off by a dark area on the hinder cheek. Above, a dark area projects forward above the head as far as the front edge of the eye. Between eye and snout, the white area extends over the median crest onto the left side. The point of the hook on the lower side is white but hardly so much so as the upper side. One can sum up by saying that the lower head proper is framed in black, and that, except for this white head and the pectoral fin, the whole lower surface is black. Seen on the lower surface are certain rather ill-defined spots. Indefinite as these are they are more marked than those on the upper side. Careful insertion of a needle in these lower spots shows that each is directly opposite (underneath) a corresponding upper side spot.

This almost totally ambicolorate flounder exemplifies the rule for such extreme ambicoloration. This rule is that this large amount of dark under surface is accompanied by the two head anomalies of an incompletely rotated eye and a hooked dorsal fin.

A COMPLETELY AMBICOLORATE SPECIMEN

WITH INCOMPLETELY ROTATED EYE AND HOOKED DORSAL FIN

This specimen was found among other flounders on a fish-landing pier at Norfolk, Va., in March, 1936, by Mr. F. E. Firth of the U. S. Bureau of Fisheries. Its place of capture can be given only approximately as on the trawling grounds S. S. E. of Chesapeake Light, which lies about 12 mi. out from the mouth of Chesapeake Bay. This is the most definite northern record of its capture on our Atlantic coast.

This fish is 295 mm. (11.6 in.) long over all, and weighs 226.8 grams (8 oz.). It came up from Norfolk frozen, and unfortunately was not thawed out before being placed in alcohol. And more unfortunately it was not pinned out on a board during the pickling process. As a result it has become badly crumpled and twisted. For these reasons it has not been possible to have the lower surface photographed—to my great regret. However, I have had both sides of the head drawn. This distortion has caused protrusion of white under-throat and gill parts as shown in the figures.

Seen from the upper or sinistral side, this fish is entirely normal save in the head region as shown in Fig. 4. The right eye is barely over the dorsal crest. In fact its right or lower edge is hardly over the ridge. Overhanging this eye is the deeply hooked anterior point of the dorsal fin. The left side of the point of this dorsal fin-hook is white.

The lower right or blind side is everywhere absolutely of the same color as the upper, left or eyed side. This flounder is *bilaterally colored*. It is what the fishermen called a "black belly,"—i.e., a flatfish having

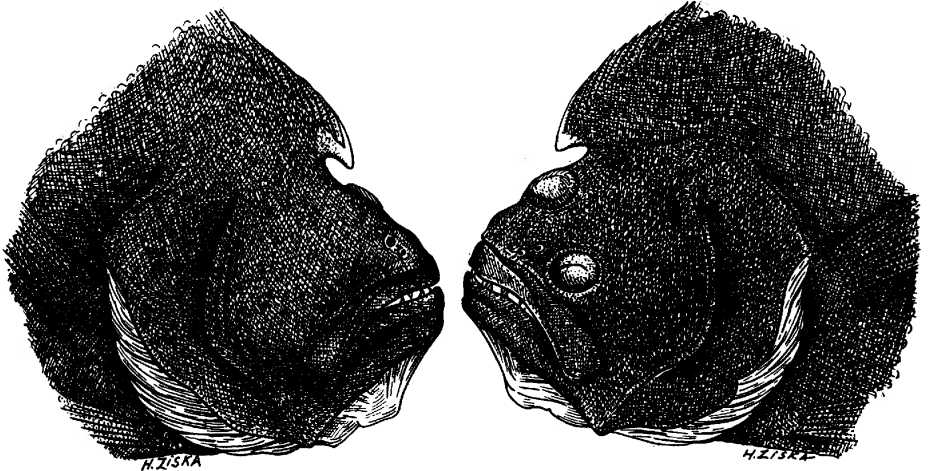


Fig. 5

Fig. 4

Right and left sides of the head of a totally ambicolorate southern flounder, *Paralichthys lethostigma*.

Fig. 4. Note the right eye barely across the dorsal crest and the overhanging hook (white at the point) of the dorsal fin.

Fig. 5. Note that the blind side of this head is colored exactly like the eyed side. The rotated eye is still visible, and the point of the dorsal fin-hook is white.

Specimen from Mr. F. E. Firth.

the lower surface colored like the upper side. As explained no figure of the lower surface can be given, but the drawing of the lower side of the head (Fig. 5) when contrasted with that of the upper side shows the same coloration, the same hook to the dorsal fin (with its whitish point), and the right eye still shows above the dorsal crest.

A front view of the head of this fish (Fig. 6) shows that, in front of the dorsal fin and its hook, the head instead of being in line with the dorsal fin is twisted slightly to the left. This seems to be the rule. At any rate the other two fish described in this paper show the same thing.

This is certainly due to the slight twisting that the skull and other parts have undergone in the course of the migration of the eye. Note that the right edge of the dorsal fin-hook, the right edge of the rotated eye, the right nasal openings, and the right canine teeth are in the same plane. This figure is, I believe, the first to show in head-on view the eye and dorsal fin peculiarities of such a flatfish.

It should be emphasized that these three ambicolorates form a fine series. Fish no. I is only partially (about $\frac{3}{5}$ ths) ambicolorate below and has no head anomalies. No. II has the whole under body and at

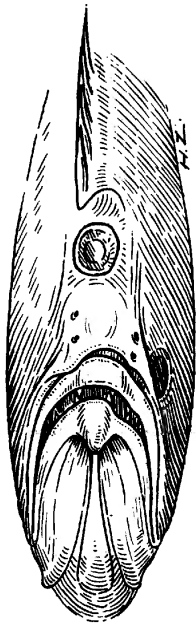


Fig. 6. Head on view of the totally ambicolorate flounder to show the relative positions of snout, rotated eye and hooked dorsal fin.

Sketched from fish No. III.

least $\frac{1}{3}$ rd of the head dark like the upper side, and has the incompletely rotated eye and the hooked dorsal fin. Finally fish no. III is bilaterally colored in maturity as in prelarval-hood but, instead of having bilateral eyes, it has the rotating eye almost cyclopean and it has the accompanying hooked dorsal fin.

No attempt will be made here to explain the anomalies described herein. This will be done later in two general papers in which the phenomenon of ambicoloration, both partial and complete, will be gone into thoroughly.

